



Forecast Fundamentals:

Surf Observations

Elements of Surf Observations

“The safety and success of amphibious landings is largely dependent upon *known surf conditions.*”

Surf Observation Report

SUROB NO _____

BEACH _____

DATE/TIME _____

ALFA _____ PT _____

Significant breaker = avg of highest 1/3 to nearest ½ foot.

BRAVO _____ PT _____

Max breaker = nearest ½ foot

CHARLIE 7 _____ PT 5 _____

Breaker period = nearest 5/10 of a second

DELTA _____ PLUNGING _____ SPILLING _____ SURGING _____

breaker type = percentage applicable

ECHO _____ TOWARD _____ FLANK _____

Breaker angle = acute angle that breaker makes with beach.

FOXTROT _____ PT _____ KT TOWARD _____ FLANK _____

Littoral current = measured to nearest 1/10 of a knot.

Note 1 KT = 100 ft per minute

GOLF _____ TO _____ LINE IN _____ FT

Surf Zone. Predominant number of breakers in , and width of.

HOTEL _____

Pertinent remarks = Wind, weather, visibility, secondary wave systems, etc.

WAVE HEIGHT COMPUTATIONS FOR HIGHEST 33 WAVES

HEIGHT OCCURRENCE PRODUCT

_____ X _____ = _____

_____ X _____ = _____

_____ X _____ = _____

_____ X _____ = _____

_____ X _____ = _____

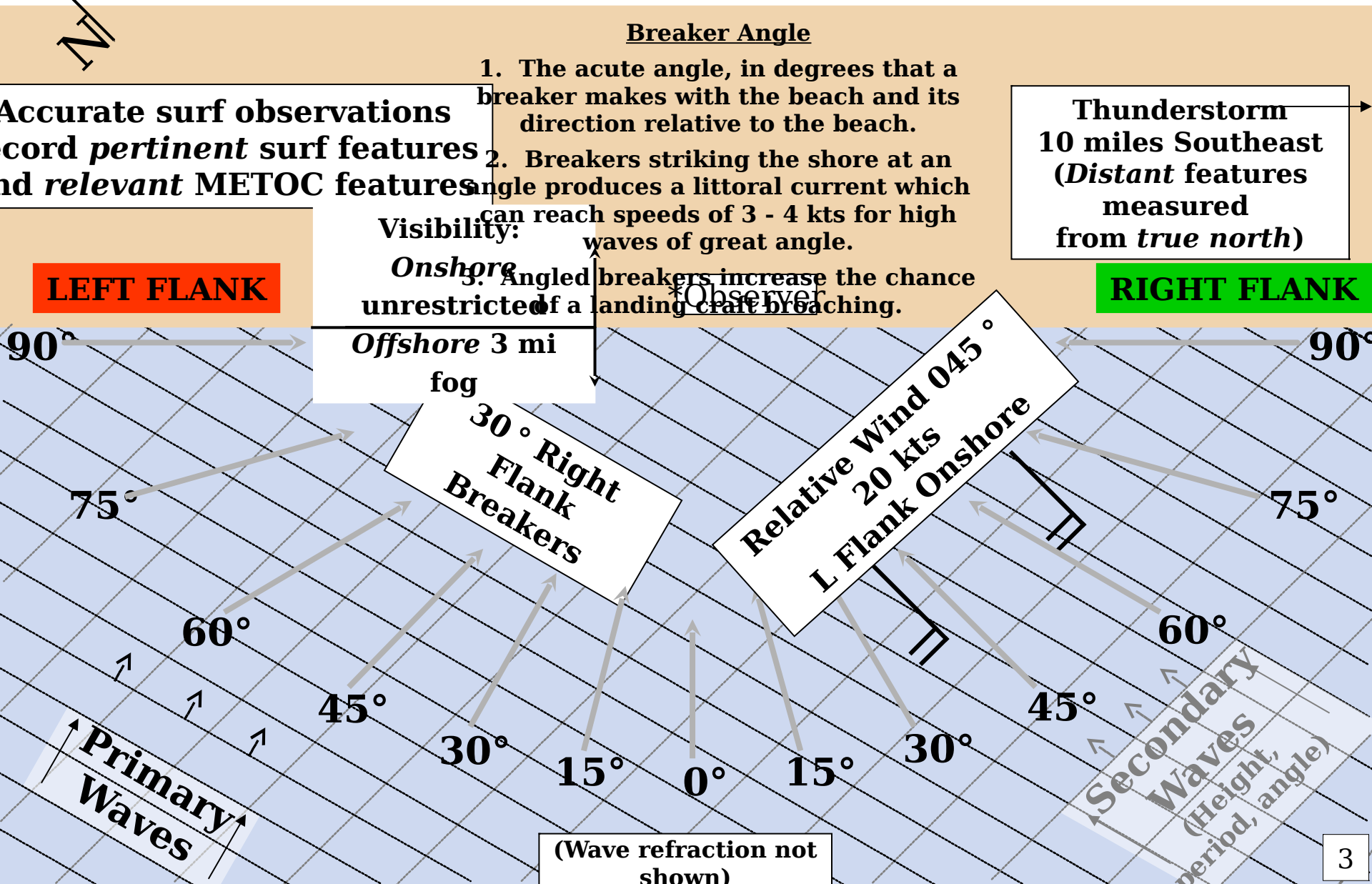
TOTAL = _____ = _____ ALFA
33

Wave Height Observations				
Time Began:				
P=Plunging S=Spilling X=Surging				
1	21	41	61	81
2	22	42	62	82
3	23	43	63	83
4	24	44	64	84
5	25	45	65	85
6	26	46	66	86
7	27	47	67	87
8	28	48	68	88
9	29	49	69	89
10	30	50	70	90
11	31	51	71	91
12	32	52	72	92
13	33	53	73	93
14	34	54	74	94
15	5	55	75	95
16	36	56	76	96
17	37	57	77	97
18	38	58	78	98
19	39	59	79	99
20	40	60	80	100
Time Ended:				
Wave Period Computation:				
Elapsed Time XXMIN XXSEC				
Total Seconds =xx/100=CHARLIE				

Source: Joint Surf Manual

Elements of Surf Observations: The “Big Picture”

“Most measurements made *relative* to the beach from the *ocean’s* perspective”



Wave Height Observation

Wave Height Observations				
Time Began:				
P=Plunging S=Spilling X=Surging				
1	3.5 S	21	41	61
2		22	42	62
3		23	43	63
4		24	44	64
5		25	45	65
6		26	46	66
7		27	47	67
8		28	48	68
9		29	49	69
10		30	50	70
11		31	51	71
12		32	52	72
13		33	53	73
14		34	54	74
15		5	55	75
16		36	56	76
17		37	57	77
18		38	58	78
19		39	59	79
20		40	60	80
				81
				82
				83
				84
				85
				86
				87
				88
				89
				90
				91
				92
				93
				94
				95
				96
				97
				98
				99
				100
Time Ended:				
Wave Period Computation:				
Elapsed Time XXMIN XXSEC				
Total Seconds =xx/100=CHARLIE				

- A form similar to that on the left is required to take an accurate surf observation.
- The process begins by observing 100 successive breakers, recording the height and type of each breaker.**
- Heights are recorded to the nearest half-foot. "3.5 ft spilling" encoded as "3.5 S"
- Additionally, the total time for the observations is recorded.
- An example completed form is shown on page 12.

** Note: under actual combat conditions, 50 breakers are counted.

Surf Observation Report
 SUROB NO _____
 BEACH _____
 DATE/TIME _____

A { **ALFA 4 PT 0**
Significant breaker = avg of highest 1/3 to nearest 1/2 foot.

B { **BRAVO 5 PT 5**
Max breaker = nearest 1/2 foot

CHARLIE _____ PT _____
 Breaker period = nearest 5/10 of a second
 DELTA _____ PLUNGING _____ SPILLING _____ SURGING
 breaker type = percentage applicable
 ECHO _____ TOWARD _____ FLANK
 Breaker angle = acute angle that breaker makes with beach.
 FOXTROT _____ PT _____ KT TOWARD _____ FLANK
 Littoral current = measured to nearest 1/10 of a knot.
 Note 1 KT = 100 ft per minute
 GOLF _____ TO _____ LINE IN _____ FT
 Surf Zone. Predominant number of breakers in , and width of
 HOTEL _____

Pertinent remarks = Wind, weather, visibility, secondary
 wave systems, etc.

WAVE HEIGHT COMPUTATIONS FOR HIGHEST 33 WAVES

HEIGHT	OCCURRENCE	PRODUCT
<u>5.5</u>	X <u>1</u>	= <u>5.5</u>
<u>5.0</u>	X <u>4</u>	= <u>20.0</u>
<u>4.5</u>	X <u>9</u>	= <u>40.5</u>
<u>4.0</u>	X <u>15</u>	= <u>60.0</u>
<u>3.5</u>	X <u>4</u>	= <u>14.0</u>

TOTAL = 140 = 4.24 = ALFA
 33

Sig, Max Breaker Height

A. The highest 1/3 of the observed
 breakers are recorded, then averaged
 (see bottom left).

1	4.0S	21	2.5S	41	3.0S	61	4.0S	81	2.5S
2	4.5S	22	4.0S	42	3.0S	62	3.0S	82	2.5S
3	3.5S	23	4.0S	43	4.5S	63	3.5S	83	3.5S
4	3.5S	24	3.5S	44	2.5S	64	4.0S	84	3.5S
5	4.0S	25	2.0S	45	2.5S	65	3.5S	85	4.0S
6	2.5S	26	1.0S	46	1.0S	66	2.5S	86	1.0S
7	3.0S	27	1.5S	47	4.5S	67	2.5S	87	2.5S
8	3.5S	28	3.0S	48	1.5S	68	1.0S	88	4.0S
9	3.0S	29	2.5S	49	1.5S	69	1.0S	89	1.5S

• The result of the average is reported
 as element ALFA, recorded to the
 nearest 1/2 foot.

(Example lower left: 4 foot breakers)

B. The maximum breaker is the **highest**
 breaker noted in the observed set.
 This is reported as element BRAVO,
 also recorded to the nearest 1/2 foot.
 (Example at left: max breakers 5.5 ft)

Surf Observation Report

SUROB NO _____

BEACH _____

DATE/TIME _____

ALFA ____ PT ____

Significant breaker = avg of highest 1/3 to nearest 1/2 foot.

BRAVO ____ PT ____

Max breaker = nearest 1/2 foot

© { **CHARLIE_7_PT_5_**
Breaker period = nearest 5/10 of a second

DELTA ____ PLUNGING ____ SPILLING ____ SURGING

breaker type = percentage applicable

ECHO ____ TOWARD ____ FLANK

Breaker angle = acute angle that breaker makes with beach.

FOXTROT ____ PT ____ KT TOWARD ____ FLANK

Littoral current = measured to nearest 1/10 of a knot.

Note 1 KT = 100 ft per minute

GOLF ____ TO ____ LINE IN ____ FT

Surf Zone. Predominant number of breakers in , and width of

HOTEL _____

Pertinent remarks = Wind, weather, visibility, secondary wave systems, etc.

WAVE HEIGHT COMPUTATIONS

FOR HIGHEST 33 WAVES

HEIGHT OCCURRENCE PRODUCT

____ X _____ = _____
 ____ X _____ = _____
 ____ X _____ = _____
 ____ X _____ = _____
 ____ X _____ = _____

TOTAL = _____ = _____ ALFA
 33

Breaker period

C. Add the total time for 100 obs and divide by 33 (combat conditions, total time for 50 obs divided by 16). This is the **breaker (wave) period.**

Wave Height Observations									
Time Began:		10 min		10 sec					
P=Plunging S=Spilling X=Surging									
1	40S	21	25S	41	30S	61	40S	81	25S
2	45S	22	40S	42	30S	62	30S	82	25S
19	35S	39	15S	59	40S	79	20P	99	45S
20	40S	40	15S	60	40S	80	25S	100	20S
Time Ended:		22 min		15 sec					
Wave Period Computation:									
Elapsed time:		12 min		05 sec					
Total seconds =		725		/100 = 7.25 = Charlie					

• Breaker period is measured to the nearest 1/2 second and is reported as element CHARLIE.

(Example : breaker period 7.5 sec)

Surf Observation Report
 SUROB NO _____
 BEACH _____
 DATE/TIME _____

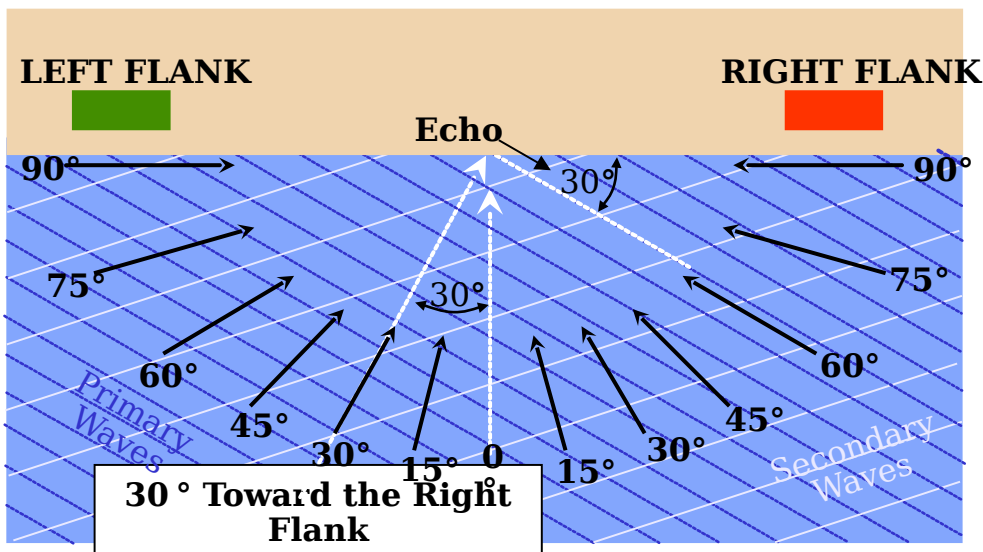
ALFA ____ PT ____
 Significant breaker = avg of highest 1/3
 BRAVO ____ PT ____
 Max breaker = nearest 1/2 foot
 CHARLIE ____ PT ____
 Breaker period = nearest 5/10 of a second

68	1.0S	88	4.0S
69	1.0S	89	1.5S
70	1.0S	90	4.0S
71	2.5P	91	3.5S
72	2.5P	92	3.5S
73	3.0S	93	1.0S
74	2.5S	94	3.5P
75	2.0S	95	4.5S

D { DELTA_10_PLUNGING_90_SPILLING_0_SURGING
 breaker type = percentage applicable

E { ECHO_30__TOWARD __R_FLANK
 Breaker angle = acute angle that breaker makes with beach.

FOXTROT ____ PT ____ KT TOWARD ____ FLANK
 Littoral current = measured to nearest 1/10 of a knot.
 Note 1 KT = 100 ft per minute
 GOLF ____ TO ____ LINE IN ____ FT
 Surf Zone. Predominant number of breakers in , and width of.
 HOTEL _____



Breaker Types, Angle With Beach

D. The total number of spilling, plunging, and/or surging waves is recorded. The *percentage* of each is then reported as element DELTA.

E. The **Breaker Angle** is the angle the breaker makes with the beach, as seen from a landing craft's perspective. Recorded as moving **toward** either the right or left flank (see diagram lower left).

- This value is recorded in degrees and reported as element ECHO.
- Multiple wave trains (e.g., sea waves from one direction, swell from another) are recorded as necessary. *Primary* waves are reported as element ECHO, *secondary* waves are reported in section HOTEL (height, period, angle breakers make with beach).

Surf Observation Report

SUROB NO _____

BEACH _____

DATE/TIME _____

ALFA _____ PT _____

Significant breaker=avg of highest 1/3 to nearest 1/2 foot.

BRAVO _____ PT _____

Max breaker=nearest 1/2 foot

CHARLIE _____ PT _____

Breaker period=nearest 5/10 of a second

DELTA _____ PLUNGING _____ SPILLING _____ SURGING

breaker type=percentage applicable

ECHO _____ TOWARD _____ FLANK

Breaker angle=acute angle that breaker makes with beach.

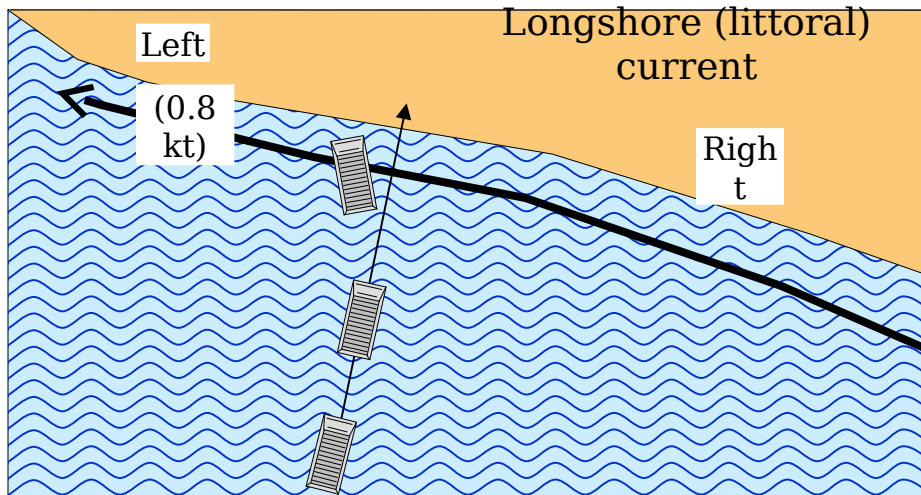
F { **FOXTROT_0_PT_8_KT TOWARD_L_FLANK**
Littoral current = measured to nearest 1/10 of a knot.
Note 1 KT = 100 ft per minute

GOLF _____ TO _____ LINE IN _____ FT

Surf Zone. Predominant number of breakers in , and width of.

HOTEL _____

Pertinent remarks = Wind, weather, visibility, secondary wave systems, etc.



Littoral Current

F. Littoral (longshore) currents are measured by throwing a piece of wood / other debris into the surf, immediately in front of the innermost breaker. The distance traveled in 1 minute is then measured.

• Each 10 feet traveled in the minute is equal to 0.1 kt of current. (30 feet traveled in 1 min = 0.3 kts current).

• The direction towards which the current is moving is called the **set**. (e.g., right/left flank of the beach)

• Information is reported in knots to the nearest 0.1, and recorded as element FOXTROT.

• Decreasing wave period or increasing wave height increases the littoral current.

(Example at left: 0.8 kt current toward the left flank)

Surf Observation Report

SUROB NO _____

BEACH _____

DATE/TIME _____

ALFA ____ PT ____

Significant breaker = avg of highest 1/3 to nearest 1/2 foot.

BRAVO ____ PT ____

Max breaker = nearest 1/2 foot

CHARLIE ____ PT ____

Breaker period = nearest 5/10 of a second

DELTA __ PLUNGING __ SPILLING __ SURGING

breaker type = percentage applicable

ECHO __ TOWARD __ FLANK

Breaker angle = acute angle that breaker makes with beach.

FOXTROT ____ PT ____ KT TOWARD ____ FLANK

Littoral current = measured to nearest 1/10 of a knot.

Note 1 KT = 100 ft per minute

GOLF ____ TO ____ LINE IN ____ FT
Surf Zone. Predominant number of breakers in, and width of.

HOTEL _____

Pertinent remarks = Wind, weather, visibility, secondary wave systems, etc.

WAVE HEIGHT COMPUTATIONS FOR HIGHEST 33 WAVES

HEIGHT	OCCURRENCE	PRODUCT
____ X	_____	= _____
____ X	_____	= _____
____ X	_____	= _____
____ X	_____	= _____
____ X	_____	= _____

TOTAL = _____ = _____ ALFA

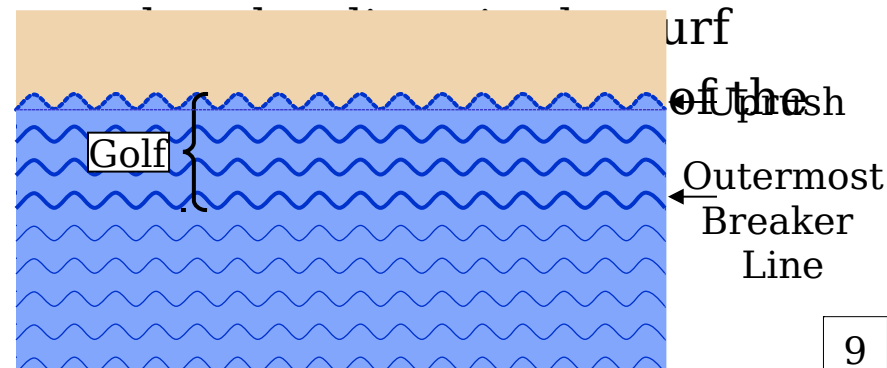
33

Surf Zone

- When approaching a beach, a wave will break when water depth is 1.3 times the wave height. Over sandbars, it is 1.7 times. This is the outermost limit and depth of the surf zone.

The surf zone is the area extending from the outermost breaker line to the limit of the uprush on the beach. GOLF is determined by:

- Counting the number of



Surf Observation Report

SUROB NO _____

BEACH _____

DATE/TIME _____

ALFA ____ PT ____

Significant breaker = avg of highest 1/3 to nearest 1/2 foot.

BRAVO ____ PT ____

Max breaker = nearest 1/2 foot

CHARLIE ____ PT ____

Breaker period = nearest 5/10 of a second

DELTA __ PLUNGING __ SPILLING __ SURGING

breaker type = percentage applicable

ECHO ____ TOWARD ____ FLANK

Breaker angle = acute angle that breaker makes with beach.

FOXTROT ____ PT ____ KT TOWARD ____ FLANK

Littoral current = measured to nearest 1/10 of a knot.

Note 1 KT = 100 ft per minute

GOLF ____ TO ____ LINE IN ____ FT

Surf Zone. Predominant number of breakers in, and width of.

HOTEL _____

H

Pertinent remarks = Wind, weather, visibility, secondary weather (element and location relative to beach), wave systems, etc.

WAVE HEIGHT COMPUTATIONS
FOR HIGHEST 33 WAVES

HEIGHT	OCCURRENCE	PRODUCT
____ X	_____ =	_____
____ X	_____ =	_____
____ X	_____ =	_____
____ X	_____ =	_____
____ X	_____ =	_____

TOTAL = _____ = _____ ALFA
33

Additional Remarks

H. Any significant factors that might influence boat ops are recorded as element HOTEL:

- **Relative** wind speed/direction (measured the same way as element ECHO, noted as on- or off-shore)

“REL WIND 045° 15 kts R FLANK ONSHORE”

Weather (element and location relative to beach)

“THUNDERSTORM 5 MILES SE”

- Visibility (estimated in miles, with obstructions to vision reported as applicable)

“VSBY SEAWARD 2 MILES
FOG, VSBY INLAND UNRESTR”

Surf Observation Report

SUROB NO _____

BEACH _____

DATE/TIME _____

ALFA ____ PT ____

Significant breaker = avg of highest 1/3 to nearest 1/2 foot.

BRAVO ____ PT ____

Max breaker = nearest 1/2 foot

CHARLIE ____ PT ____

Breaker period = nearest 5/10 of a second

DELTA __ PLUNGING __ SPILLING __ SURGING

breaker type = percentage applicable

ECHO ____ TOWARD ____ FLANK

Breaker angle = acute angle that breaker makes with beach.

FOXTROT ____ PT ____ KT TOWARD ____ FLANK

Littoral current = measured to nearest 1/10 of a knot.

Note 1 KT = 100 ft per minute

GOLF ____ TO ____ LINE IN ____ FT

Surf Zone. Predominant number of breakers in, and width of.

HOTEL _____

Pertinent remarks = Wind, weather, visibility, secondary wave systems, etc.

WAVE HEIGHT COMPUTATIONS
FOR HIGHEST 33 WAVES

HEIGHT	OCCURRENCE	PRODUCT
____ X	_____ =	_____
____ X	_____ =	_____
____ X	_____ =	_____
____ X	_____ =	_____
____ X	_____ =	_____

TOTAL = _____ = _____ ALFA
33

Additional Remarks

- Rip currents (location related to centerline, right/left flanks, width)

“RIP CURRENT CHANNEL
LEFT FLANK RED 30 YDS
WIDE”

- Secondary waves (report height, period, and angle breakers make to beach)

“SECONDARY WAVES ALFA
2 PT 0 BRAVO 3 PT 0
CHARLIE 5 PT 0 ECHO 20
TOWARD RIGHT FLANK”

- Other possible remarks:
 - Debris in the surf zone
 - Presence of exposed/submerged bars

Surf Observation Report

SUROB NO **ONE**

BEACH **BLUE**

DATE/TIME **19 OCTOBER / 1200**

ALFA **4** PT **0**

Significant breaker = avg of highest 1/3 to nearest 1/2 foot.

BRAVO **5** PT **5**

Max breaker = nearest 1/2 foot

CHARLIE **7** PT **5**

Breaker period = nearest 5/10 of a second

DELTA **5** PLUNGING **95** SPILLING **5** SURGING **0**

breaker type = percentage applicable

ECHO **45** TOWARD **L** FLANK

Breaker angle = acute angle that breaker makes with beach.

FOXTROT **0** PT **8** KT TOWARD **L** FLANK

Littoral current = measured to nearest 1/10 of a knot.

Note 1 KT = 100 ft per minute

GOLF **3** TO **4** LINE IN **300** FT

Surf Zone. Predominant number of breakers in , and width of

HOTEL **RELATIVE WIND 045 / 15 KTS**

VISIBILITY 10 MILES

Pertinent remarks = Wind, weather, visibility, secondary wave systems, etc.

WAVE HEIGHT COMPUTATIONS

FOR HIGHEST 33 WAVES

HEIGHT OCCURRENCE PRODUCT

5.5 X **1** = **5.5**

5.0 X **4** = **20.0**

4.5 X **9** = **40.5**

4.0 X **15** = **60.0**

3.5 X **4** = **14.0**

TOTAL = **140** = **4.24** ALFA

Example Worksheets

Wave Height Observations

Time Began: **10 min** **10 sec**

P=Plunging S=Spilling X=Surging

1	4.0S	21	2.5S	41	3.0S	61	4.0S	81	2.5S
2	4.5S	22	4.0S	42	3.0S	62	3.0S	82	2.5S
3	3.5S	23	4.0S	43	4.5S	63	3.5S	83	3.5S
4	3.5S	24	3.5S	44	2.5S	64	4.0S	84	3.5S
5	4.0S	25	2.0S	45	2.5S	65	3.5S	85	4.0S
6	2.5S	26	1.0S	46	1.0S	66	2.5S	86	1.0S
7	3.0S	27	1.5S	47	4.5S	67	2.5S	87	2.5S
8	3.5S	28	3.0S	48	1.5S	68	1.0S	88	4.0S
9	3.0S	29	2.5S	49	1.5S	69	1.0S	89	1.5S
10	2.0S	30	3.0S	50	2.0S	70	1.0S	90	4.0S
11	2.5S	31	4.5S	51	1.0S	71	2.5P	91	3.5S
12	4.0S	32	4.5P	52	1.0S	72	2.5P	92	3.5S
13	4.0S	33	5.0S	53	2.5S	73	3.0S	93	1.0S
14	3.5S	34	2.5S	54	2.0S	74	2.5S	94	3.5P
15	4.5S	35	1.0S	55	4.5S	75	2.0S	95	4.5S
16	5.0S	36	1.0S	56	4.5S	76	5.0S	96	5.0S
17	3.5S	37	3.0S	57	3.0S	77	4.0S	97	3.0S
18	3.0S	38	3.5S	58	3.5S	78	2.5S	98	5.5S
19	3.5S	39	1.5S	59	4.0S	79	2.0P	99	4.5S
20	4.0S	40	1.5S	60	4.0S	80	2.5S	100	2.0S

Time Ended: **22 min** **15 sec**

Wave Period Computation:

Elapsed time: **12 min** **05 sec**

Total seconds = **725**/100 = 7.25 = Charlie